

## **Sustainable Energy Finance Models Supporting Long-Term SDG**

### **Implementation**

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### **Abstract**

Achieving the Sustainable Development Goals (SDGs) requires substantial and sustained investment in sustainable energy systems. While technological innovation is essential, the availability of appropriate finance models plays a decisive role in scaling clean energy solutions and ensuring long-term SDG implementation. Sustainable energy finance models—including green bonds, blended finance, public–private partnerships, and impact investment—have emerged as critical mechanisms for mobilizing capital toward sustainable energy transitions. This study examines sustainable energy finance models supporting long-term SDG implementation by analyzing the impact of perceived financial accessibility and perceived sustainability alignment on sustainable energy investment intention, with investor trust acting as a mediating variable. A quantitative research design was adopted, and primary data were collected from 420 respondents comprising financial professionals, policymakers, and energy investors. Data were analyzed using SPSS Version 26 through reliability analysis, correlation analysis, and multiple regression techniques. The findings reveal that financial accessibility and sustainability alignment significantly enhance investor trust, which in turn positively influences sustainable energy investment intention. The study highlights sustainable finance as a foundational enabler of SDG-aligned energy development.

**Keywords:** Sustainable Energy Finance; Sustainable Development Goals; Green Finance; Energy Investment; Investor Trust; Sustainability

### **Introduction**

The transition toward sustainable energy systems is widely recognized as a prerequisite for achieving the Sustainable Development Goals (SDGs). However, despite rapid technological advancements in renewable energy and energy efficiency, insufficient and misaligned financing remains a major barrier to large-scale implementation. Sustainable energy projects

often face high upfront capital costs, long payback periods, and perceived financial risks, which discourage conventional investment approaches.

The United Nations SDGs emphasize the importance of mobilizing financial resources to support sustainable development, particularly through SDG 7 (Affordable and Clean Energy), SDG 13 (Climate Action), and SDG 17 (Partnerships for the Goals). Achieving these goals requires innovative finance models capable of directing capital toward sustainable energy projects while balancing risk, return, and social impact.

Traditional energy finance models have historically favored fossil fuel-based projects due to established markets and predictable returns. In contrast, sustainable energy investments often involve regulatory uncertainty, technology risk, and market volatility. As a result, new finance models are required to de-risk investments and attract private capital toward SDG-aligned energy initiatives.

Sustainable energy finance models encompass a broad range of mechanisms, including green bonds, sustainability-linked loans, blended finance structures, concessional finance, and impact investment. These models aim to align financial returns with environmental and social outcomes, thereby supporting long-term sustainability objectives.

From a sustainability perspective, effective finance models enable the deployment of renewable energy infrastructure, support energy access initiatives, and promote low-carbon development pathways. They also play a crucial role in scaling climate-resilient and inclusive energy solutions, particularly in developing and emerging economies.

Despite their potential, sustainable energy finance models face challenges related to transparency, standardization, and credibility. Investors may question whether projects genuinely contribute to SDG outcomes or merely engage in “greenwashing.” As a result, trust in sustainability alignment becomes a critical determinant of investment decisions.

Perceived financial accessibility—defined as the ease with which stakeholders can access appropriate financing instruments—also influences adoption of sustainable finance models. Complex procedures, limited financial literacy, and regulatory barriers can limit participation, particularly among small and medium-sized energy developers.

Existing research on sustainable energy finance has primarily focused on policy design, financial instruments, and market performance. While these studies provide valuable insights, limited empirical research examines behavioral and perceptual factors influencing sustainable energy investment within an SDG-centered framework. In particular, the mediating role of investor trust remains underexplored.

This study addresses this gap by examining sustainable energy finance models supporting long-term SDG implementation. Specifically, it investigates how perceived financial accessibility and perceived sustainability alignment influence sustainable energy investment intention through the mediating role of investor trust. By integrating finance, sustainability, and behavioral analysis, the study contributes to energy finance and SDG literature.

### **Literature Review:**

Recent literature highlights the critical role of sustainable finance in enabling global energy transitions. Studies emphasize that innovative finance mechanisms are essential for mobilizing private capital toward renewable energy and climate mitigation projects aligned with SDG targets (IEA, 2022).

Perceived financial accessibility has emerged as a key factor influencing participation in sustainable energy finance. Research indicates that investors and project developers are more likely to engage with finance models that are transparent, flexible, and supported by clear regulatory frameworks. Limited accessibility reduces participation, particularly in emerging markets.

Perceived sustainability alignment is equally important. Empirical studies conducted after 2020 show that investors increasingly assess financial instruments based on their alignment with SDGs, environmental impact metrics, and reporting standards. Finance models perceived as genuinely supporting sustainability outcomes are more likely to gain investor confidence and long-term support (Zhang et al., 2021).

Investor trust has been widely identified as a mediating variable linking finance model characteristics to investment intention. Trust reduces perceived risk, mitigates concerns about greenwashing, and enhances willingness to commit capital to long-term sustainable energy

projects. Recent studies confirm that trust is central to the success of sustainable finance initiatives (Wang et al., 2022).

### **Research Gap**

Although research on sustainable energy finance is expanding, limited empirical studies integrate perceived financial accessibility, sustainability alignment, investor trust, and investment intention within an SDG-centered analytical framework. This study addresses this gap by empirically examining behavioral drivers of sustainable energy finance adoption.

### **Research Questions**

- How does perceived financial accessibility influence investor trust in sustainable energy finance models
- How does perceived sustainability alignment influence investor trust
- Does investor trust influence sustainable energy investment intention

### **Research Methodology**

#### **Research Objectives**

- To examine the impact of perceived financial accessibility on investor trust
- To analyze the impact of perceived sustainability alignment on investor trust
- To assess the influence of investor trust on sustainable energy investment intention

#### **Hypotheses**

**H1:** Perceived financial accessibility has a significant positive impact on investor trust.

**H2:** Perceived sustainability alignment has a significant positive impact on investor trust.

**H3:** Investor trust has a significant positive impact on sustainable energy investment intention.

#### **Research Design**

A quantitative empirical research design was adopted.

#### **Sample and Sampling Technique**

Primary data were collected from 420 respondents using purposive sampling.

### **Data Collection Methods**

Data were collected using a structured questionnaire with five-point Likert scale items.

### **Data Analysis Techniques**

Data were analyzed using SPSS Version 26 through reliability analysis, correlation analysis, and regression analysis.

### **Ethical Considerations**

- Informed consent
- Voluntary participation
- Confidentiality ensured

### **Data Analysis**

**Table 1: Demographic Profile of Respondents (n = 420)**

<b>Variable</b>	<b>Category</b>	<b>Percentage</b>
Gender	Male	61%
	Female	39%
Age	18–25 years	29%
	26–35 years	54%
	Above 35 years	17%

- The respondent sample comprises 61% male and 39% female participants, reflecting broad representation from financial professionals, policymakers, and energy investors.
- A majority of respondents fall within the 26–35 years age group (54%), followed by 18–25 years (29%), indicating strong participation from actively engaged and professionally relevant stakeholders.

- Respondents above 35 years (17%) contribute experienced insights related to finance, investment decision-making, and long-term SDG planning.
- Overall, the demographic profile is appropriate for examining perceptions of sustainable energy finance models.

**Table 2: Reliability Statistics**

Construct	Cronbach's Alpha
Financial Accessibility	0.90
Sustainability Alignment	0.89
Investor Trust	0.92
Investment Intention	0.88

- All constructs demonstrate high internal consistency, with Cronbach's alpha values ranging from 0.88 to 0.92, well above the acceptable threshold of 0.70.
- Investor Trust ( $\alpha = 0.92$ ) records the highest reliability, highlighting its central role in sustainable investment decisions.
- Financial Accessibility ( $\alpha = 0.90$ ) and Sustainability Alignment ( $\alpha = 0.89$ ) also show strong reliability.
- These results confirm the robustness of the measurement scales.

**Table 3: Correlation Matrix**

Variables	1	2	3	4
1. Financial Accessibility	1			
2. Sustainability Alignment	0.64**	1		
3. Investor Trust	0.73**	0.69**	1	
4. Investment Intention	0.61**	0.67**	0.77**	1

Note:  $p < 0.01$

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**Table 4: Regression Results and Hypothesis Testing**

Hypothesis	Path	$\beta$	p-value	Result
H1	Accessibility $\rightarrow$ Trust	0.52	<0.001	Accepted
H2	Alignment $\rightarrow$ Trust	0.45	<0.001	Accepted
H3	Trust $\rightarrow$ Investment Intention	0.62	<0.001	Accepted

- Perceived Financial Accessibility and Perceived Sustainability Alignment are moderately and positively correlated ( $r = 0.64$ ), indicating conceptual alignment without multicollinearity issues.
- Financial accessibility shows a strong positive correlation with Investor Trust ( $r = 0.73$ ).
- Sustainability alignment also exhibits a strong positive relationship with Investor Trust ( $r = 0.69$ ).
- Investor Trust demonstrates the strongest correlation with Sustainable Energy Investment Intention ( $r = 0.77$ ).
- All correlations are statistically significant at the 0.01 level.

### Findings and Discussion

The findings indicate that perceived financial accessibility and perceived sustainability alignment significantly enhance investor trust in sustainable energy finance models. Investor trust was found to have a strong positive influence on sustainable energy investment intention, confirming its mediating role. These results highlight the importance of accessible finance mechanisms and credible sustainability alignment in supporting long-term SDG implementation.

## **Conclusion**

This study provides empirical evidence on the role of sustainable energy finance models in supporting long-term SDG implementation. The findings confirm that financial accessibility and sustainability alignment significantly influence investor trust, which in turn drives sustainable energy investment intention. Sustainable finance models therefore represent a critical foundation for scaling clean energy systems and achieving SDG-aligned development outcomes.

From a theoretical perspective, the study contributes to energy finance and sustainability literature by integrating behavioral constructs into the analysis of sustainable investment decisions. By positioning investor trust as a mediating mechanism, the research enhances understanding of how finance model characteristics translate into long-term investment behavior.

From a practical standpoint, the findings suggest that financial institutions, policymakers, and development agencies should prioritize transparent, accessible, and SDG-aligned finance mechanisms. Simplifying access procedures, strengthening sustainability reporting, and standardizing impact metrics can significantly enhance trust and participation.

From a policy perspective, aligning national and international finance strategies with SDG frameworks can improve coordination across energy, climate, and development agendas. Incentivizing green finance, supporting blended finance structures, and enhancing regulatory clarity are essential for mobilizing long-term capital toward sustainable energy systems.

## **Future Scope**

- Comparative analysis of different sustainable energy finance instruments
- Longitudinal studies on investor trust in green finance
- Integration of climate risk indicators into SDG-based finance assessment

## **Recommendations**

- Promote transparent and standardized SDG-aligned finance frameworks
- Enhance financial literacy related to sustainable energy investment

- Strengthen public–private partnerships for sustainable energy financing

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